

## **Method and Apparatus for Stacking Cans**

### ***Cross Reference to Related Applications***

This application claims priority from United States Provisional Patent Application Serial Number 60/419,160 filed on October 17, 2002, entitled  
5 "Stacking Device for Cans, Containers and Cylinders," which is expressly incorporated by reference herein.

### ***Background of the Invention***

#### **1. Field of the Invention**

The present invention relates to the art of stacking objects and in  
10 particular to stacking cans.

#### **2. Description of Related Art**

Various commodities, and in particular food products, have long been preserved and stored in sealed cans. These cans are typically manufactured from tin, aluminum or steel and commonly take the form of a cylindrical tube that  
15 is closed off by a lid at each of its opposing ends, each lid being recessed into the tube and sealed in place by a rim.

While this construction is suitable for efficient manufacture and reliable preservation of spoilable goods, it is poorly suited for storing cans efficiently and stably within a particular volume. The problem is that efficiency dictates that the  
20 cans be stacked vertically; however, the rims and recessed lids on the cans tend to render vertical stacks unstable because rims must be aligned with rims, edge to edge.

To avoid this problem, cans are often left in their shipping boxes, which boxes stack reasonably well. Where the cans themselves are stacked, they are  
25 generally stagger stacked into pyramids, or else where possible smaller diameter

cans are stacked on top of larger diameter cans. Nevertheless, these arrangements for stacking the cans themselves are inherently unstable. The slightest jostling of cans in a stack may cause one or more of the cans to shift relative to one another and if this shift is great enough, the entire stack will  
5 collapse, thus damaging the cans and quite possibly causing personal injury to anyone hit by the falling cans.

Over the years, numerous coupling devices have been developed in attempts to maintain can-stacks in stable vertical alignment.

One such type of coupling device is in essence a collar that snugly  
10 circumscribes the rim of at least one of two adjacent cans in a stack. In some such devices, the collar circumscribes both adjacent rims. In other such devices, there is also provided a square surface for the free can to abut and as the case may be either support or rest upon. In still other devices, there is also provided a flange for engaging the inside surface of the rim of the free can. By alternating  
15 cans and couplers, one can create a more stable stack of cans than by stacking the cans alone.

Despite their differences, these devices tend to suffer from certain common disadvantages. They are generally installed during the manufacturing or canning process and are not normally reusable by the consumer, but instead  
20 are destroyed when removed from a can so that it can be opened. Additionally, if a can, and in particular the rim of the can, has been dented, then the collar may not form a good coupling or may not engage the rim whatsoever.

Another type of coupling device is in essence a spacer that is placed upon the top lid of the lower of two vertically adjacent cans and that occupies  
25 some significant portion of the area defined within the top rim of that can. In turn, the lower lid of the upper can rests upon the spacer; however, the spacer has sufficient thickness to prevent the adjacent rims of these two cans from make contact and thus rendering the stack unstable. Although such couplers can be

used by consumers, even with dented cans, they nevertheless suffer from certain disadvantages. A significant disadvantage is that these couplers require that adjacent can lids be in place and in good condition. If a can lid has been dented or removed, this type of coupler may fail to work completely or may produce an  
5 unstable stack.

Accordingly, there is a need for a way to stack cans, even dented cans and cans without top or bottom lids, without clamping the cans together or resorting to disposable single-use stacking aids.

### ***Summary of the Invention***

10 The present invention is directed to a method and reusable apparatus for stacking cans, even dented cans and cans without lids, without clamping the cans together.

According to one aspect of the invention, there is provided an apparatus for maintaining an upper can and a lower can in substantially vertical alignment,  
15 the upper and lower cans each having upper and lower rims, each rim having an inside face, an opposite outside face and an edge between the faces.

The apparatus has: a body; a first flange, extending from the body and adapted to releasably engage a portion of the inside face of the lower rim of the upper can; a second flange, extending from the body substantially opposite to  
20 the first flange and substantially coaxial with the first flange, adapted to releasably engage a portion of the inside face of the upper rim of the lower can; and a third flange, extending radially from the body substantially perpendicular to the first and second flanges and adapted to releasably engage both a portion of the edge of the upper rim of the lower can and a portion of the edge of the lower  
25 rim of the upper can, such that the apparatus rests squarely on the lower can, the upper can rests squarely on the apparatus, and the apparatus urges the upper and lower cans to remain in substantially vertical alignment.

Any of the first, second, and third flanges may have a perimeter that is substantially geometrically similar to the perimeter of one of the rims of one of the cans. For example, the first, second, or third flanges might have substantially circular perimeters to correspond to the circular rims commonly found on cans.

5 Any of the first, second, and third flanges may be discontinuous, so as to save material and to have more freedom to accommodate irregularly shaped cans, for example dented cans.

The body may include one or more apertures, for example to save material and reduce weight. If the apertures are so located, the body may even  
10 include a truss for improved strength properties.

The body may also include a grip to aid placement and removal of the apparatus when stacking cans. For example, the grip could be formed as a notch in the periphery of the apparatus.

According to another aspect of the invention, there is provided a method  
15 for retaining an upper can and a lower can in substantially vertical alignment, the upper and lower cans each having upper and lower rims. The method includes: substantially squaring the edge of the upper rim of the lower can with the edge of the lower rim of the upper can; retaining the upper can in position by releasably engaging a portion of the inside face of the lower rim of the upper can; and  
20 retaining the lower can in position by releasably engaging a portion of the inside face of the upper rim of the lower can.

According to yet another aspect of the invention, there is provided a system for maintaining substantially vertical alignment in a stack. The system includes: an upper can having an upper rim and a lower rim, each rim having an  
25 inside face, an opposite outside face and an edge between the faces; an lower can having an upper rim and a lower rim, each rim having an inside face, an opposite outside face and an edge between the faces; and a coupler. The coupler includes: body; a first flange, extending from the body and adapted to

releasably engage a portion of the inside face of the lower rim of the upper can; a second flange, extending from the body substantially opposite to the first flange and substantially coaxial with the first flange, adapted to releasably engage a portion of the inside face of the upper rim of the lower can; and a third flange,  
5 extending radially from the body substantially perpendicular to the first and second flanges and adapted to releasably engage both a portion of the edge of the upper rim of the upper can and a portion of the edge of the lower rim of the upper can. So configured, the coupler rests squarely on the lower can, the upper can rests squarely on the coupler, and the coupler urges the upper and lower  
10 cans to remain in substantially vertical alignment.

Any of the first, second, and third flanges may have a perimeter that is substantially geometrically similar to the perimeter of one of the rims of one of the cans. For example, the first, second, or third flanges might have substantially circular perimeters to correspond to the circular rims commonly found on cans.

15 Any of the first, second, and third flanges may be discontinuous, so as to save material and to have more freedom to accommodate irregularly shaped cans, for example dented cans.

The body may include one or more apertures, for example to save material and reducing weight. If the apertures are so located, the body may even  
20 include a truss for improved strength properties.

The body may also include a grip to aid placement and removal of the coupler when stacking the cans. For example, the grip could be formed as a notch in the periphery of the coupler.

Further aspects and advantages of the present invention will become  
25 apparent upon considering the following drawings, description, and claims.

### ***Description of the Invention***

The invention will be more fully understood from the following detailed description taken in conjunction with the accompanying drawing figures, in which like reference numerals designate like parts throughout the various figures.

### **1. Brief Description of the Drawings**

- 5    Figure 1        is an exploded isometric view of an apparatus for stacking cans according to a first embodiment of the invention, in operating position between an upper can and a lower can;
- Figure 2        is an isometric view of the can-stacking apparatus of Figure 1, in operating position between the upper and lower can;
- 10   Figure 3        is a plan view of the can-stacking apparatus of Figure 1;
- Figure 4        is an elevational view of the can-stacking apparatus of Figure 1;
- Figure 5        is a plan view of an apparatus for stacking cans according to a second embodiment of the invention;
- Figure 6        is an elevational view of the can-stacking apparatus of Figure 5;
- 15   Figure 7        is a plan view of an apparatus for stacking cans according to a third embodiment of the invention;
- Figure 8        is a plan view of an apparatus for stacking cans according to a fourth embodiment of the invention;
- Figure 9        is a plan view of an apparatus for stacking cans according to a fifth embodiment of the invention;
- 20   Figure 10        is a plan view of an apparatus for stacking cans according to a sixth embodiment of the invention; and
- Figure 11        is an elevational view of two can-stacking apparatuses according to the first embodiment of the invention, in operating position between respectively a top can and a middle can, and the middle can and a bottom can, wherein the middle can has neither a top lid
- 25

nor a bottom lid and the bottom can has no top lid.

## **2. Detailed Description of Specific Embodiments**

### **(a) Structure**

The invention will now be further illustrated by way of specific exemplary  
5   embodiments shown in the drawings and described in greater detail herein.

Figures 1 and 2 illustrate an apparatus for stacking cans (a "coupler") according to one embodiment of the invention, generally indicated at 20, located in operating position between a top can and a bottom can, which are generally indicated at 22a and 22b respectively.

10       Each can 22a, 22b has a tubular sidewall 24 (24a, 24b respectively) that is capped by a top rim 26 (26a, 26b respectively) and an opposite bottom rim 28 (28a, 28b respectively). The tubular sidewall 24 (24a, 24b respectively) may be enclosed by a top lid 30 (30a, 30b respectively) and a bottom lid 32 (32a, 32b respectively), respectively sealed in place by the top rim 26 (26a, 26b  
15   respectively) and the bottom rim 28 (28a, 28b respectively) and a sealing compound (not shown), for example solder.

The cans 22 may be symmetrical, such that their top and bottom features are substantially identical.

With reference now to Figures 3 and 4 as well, the coupler 20 has a body  
20   40 shaped and sized to fit within the recess formed between the bottom lid 32a and bottom rim 28a of the top can 22a and the top lid 30b and top rim 26b of the bottom can 22b when the top and bottom cans 22a, 22b are vertically stacked.

A top flange 42 extends longitudinally from the body 40 and is configured to snugly but releasably engage the bottom rim 28a of the top can 22a along at  
25   least a portion of its inside surface.

A bottom flange 44 extends longitudinally from the body 40 in

substantially the opposite direction to the top flange and substantially coaxially with the top flange. The bottom flange 44 is configured to snugly but releasably engage the top rim 26b of the bottom can 22b along at least a portion of its inside surface.

5           A radial flange 46 extends radially from the body 40 and substantially perpendicular to the top and bottom flanges 42, 44. The radial flange 46 is configured to releasably engage both the bottom rim 28a of the top can 22a along at least a portion of its edge and the top rim 26b of the bottom can 22b along at least a portion of its edge.

10           With the top can 22a, the bottom can 22b and the coupler 20 being so configured, the coupler 20 can rest squarely upon the bottom can 22b, the top can 22a can rest squarely upon the coupler 20, and the coupler 20 can urge the upper and lower cans 22a, 22b to remain in substantially vertical alignment.

          To engage the appropriate rim 26, 28 of a can 22, the corresponding  
15 flange 42, 44, 46 may be configured to be geometrically similar to the rim 26, 28. For example, can rims 26, 28 are commonly circular and so a flange 42, 44, 46 might be configured to have a substantially circular perimeter of approximately the same diameter as the corresponding rim 26, 28. For reasons including saving material and reducing weight, and better engaging irregular rims 26, 28  
20 (for example rims that have been dented), the flanges 42, 44, 46 might be discontinuous.

          For reasons including saving material and reducing weight, the body 40 might be constructed to form one or more apertures 48 and any such aperture 48 might form a grip to aid placement and removal of the coupler 20. For reasons  
25 including resisting deformation and damage, the body 40 and the apertures 48 might be configured to form a truss 50.

          With reference now to Figures 5 and 6, a second embodiment of the coupler is generally indicated at 20a. The coupler 20a is characterized by a solid



body 40a and continuous top, bottom and radial flanges 42a, 44a, 46a.

With reference now to Figure 7, a third embodiment of the coupler is generally indicated at 20b. The coupler 20b is characterized by a body 40b that defines a single large aperture 48b substantially centered within the body 40b.

5       With reference now to Figure 8, a fourth embodiment of the coupler is generally indicated at 20c. The coupler 20c is characterized by a notch 52c formed in its periphery, operable as a grip to aid placement and removal of the coupler 20c. The notch 52c might also be formed for reasons including saving material and reducing weight.

10       With reference now to Figure 9, a fifth embodiment of the coupler is generally indicated at 20d. The coupler 20d is characterized by a pair of notches 52d formed in its periphery, operable as grips to aid placement and removal of the coupler 20d. The notches 52d might also be formed for reasons including saving material and reducing weight.

15       With reference now to Figure 10, a sixth embodiment of the coupler is generally indicated at 20e. The coupler 20e is characterized by three notches 52e formed in its periphery, operable as grips to aid placement and removal of the coupler 20e. The notches 52e might also be formed for reasons including saving material and reducing weight.

20       **(b) Operation**

With reference now to Figure 11, the operation of the first embodiment of the coupler 20 will now be described. The operation of the other embodiments is similar.

Figure 11 illustrates three cans 22 in a substantially vertical stack: a top  
25   can 22c, a middle can 22d and a bottom can 22e.

To build this stack, a person would place the bottom can 22e on a

substantially level surface and then rest a first coupler 20' on top of the bottom can 22e, such that the bottom flange 44' engages at least a portion of its top rim 26e along its inside surface and the radial flange 46' engages at least a portion of its top rim 26e along its edge. It should be noted that the bottom can 22e does not have a top lid 30, but that the first coupler 20' engages and is duly supported by the top rim 26e of the bottom can 22e nevertheless.

The person would then place the middle can 22d onto the first coupler 20', such that the top flange 42' engages at least a portion of its bottom rim 28d along its inside surface and the radial flange 46' engages at least a portion of its bottom rim 28d along its edge. It should be noted that the middle can 22d does not have a bottom lid 32, but that the first coupler 20' duly supports the middle can 22d nevertheless by engaging its bottom rim 28d.

The person would next rest a second coupler 20 on top of the middle can 22d, such that the bottom flange 44 engages at least a portion of its top rim 26d along its inside surface and the radial flange 46 engages at least a portion of its top rim 26d along its edge. It should be noted that the middle can 22d does not have a top lid 30 either, but that the second coupler 20 engages and is duly supported by the top rim 26d of the middle can 22d nevertheless.

Finally, the person would place the top can 22c onto the second coupler 20, such that the top flange 42 engages at least a portion of its bottom rim 28c along its inside surface and the radial flange 46 engages at least a portion of its bottom rim 28c along its edge. It should be noted that the top can 22c does in fact have a bottom lid 32c, but that the second coupler 20 can nevertheless duly support the top can 22c by engaging its bottom rim 28c and that contact between the second coupler 20 and the bottom lid 32c is not required.

So arranged, the couplers 20, 20' align and support the cans 22c, 22d, 22e into a substantially vertical stack, the couplers 20, 20' resisting movement of the coupled can rims 26d, 26e, 28c, 28d that would move a can 22c, 22d, 22e

out of such alignment.

To remove a can from the stack, the stacking process is reversed or the stack is divided into sub-stacks.

Thus, it will be seen from the foregoing examples that there has been  
5 described a method and apparatus for stacking cans in substantially vertical alignment. In general, two cans may be so stacked by: squaring the upper rim of the lower can with the lower rim of the upper can; retaining the upper can in position by engaging the inside face of its lower rim; and retaining the lower can in position by engaging the inside face of its upper rim. This result can be  
10 achieved with the aid of a coupler, which has: a body; a first flange that extends from the body to engage the inside face of the lower rim of the upper can; a second flange that extends from the body substantially opposite to the first flange and substantially coaxial with the first flange, to engage the inside face of the upper rim of the lower can; and a third flange that extends radially from the body  
15 substantially perpendicular to both the first and second flanges to engage both the edge of the upper rim of the lower can and the edge of the lower rim of the upper can.

While specific embodiments of the invention have been described and illustrated, such embodiments should be considered as only examples of the  
20 invention and not as limiting the invention itself, which is to be construed in accordance with the accompanying claims. In particular, words indicating relative position and direction (e.g. "top", "bottom", "upper", "lower", "up", "down") have been used to make examples simpler and more concrete for ease of teaching and not to limit the generality or application of the invention in any way.

25 While the invention has been described as having application for stacking cans, other applications will easily come to mind. For example, the invention could be applied to stacking large drums or short sections of pipe. Departing from cylindrical geometry, the invention could be applied to stacking general

storage containers characterized by having rims or recessed lids.